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QSK26A Quick Start Kit

User's Manual

Rev. 1.0
January 2006

www.renesas.com

Table of Contents

1.0 Introduction

The QSK26A Quick Start Kit (QSK) is a low-cost development environment for evaluating M16C/26A group microcontrollers (MCU) and Renesas software development tools.

The kit comes with a complete software development tool chain for Renesas MCUs, including High-performance Embedded Workshop (HEW), which includes Integrated Development Environment (IDE), Graphical User Interface (GUI) and Software Debugger; NC30WA C-compiler, assembler and linker; and Flash-over-USB™ (FoUSB) Programming software.

The QSK26A board features on-board in-circuit debugging and programming support (ICD), eliminating the need for an external ICD unit. All that is required for in-circuit debugging and programming with the QSK26A is a USB connection to a PC and the included development tool software.

A real-time, source-level debug environment is implemented using the HEW4 software debug interface in conjunction with the QSK26A board. The Flash-over-USB™ (FoUSB) Programmer software allows in-system programming of the QSK26A board's M16C/26A Flash MCU.

2.0 Contents of Product Package

This section describes the contents of the QSK26A product package. When unpacking your QSK26A, please check to see that all items listed below are included.

2.1. QSK26A Quick Start Kit Item List

Table 2-1 lists the items included in the QSK26A.

Table 2-1 QSK26A Item List

Item Name	Quantity	Remarks
QSK26A Board	1	M16C/26A QSK Board with integrated in-circuit debugging and programming support
6' Mini USB Cable	1	Connects QSK26A board to Host PC
CD-ROM	1	Auto-install program HEW (IDE & debugger) NC30WA (C-compiler, assembler, and linker) FoUSB Programmer USB drivers Manuals Tutorials Sample programs

2.1.1. CD-ROM

The CD-ROM contains the electronic manuals and software necessary for developing programs. Your computer must have a web browser — like Mozilla Firefox, Netscape® Browser or Microsoft® Internet Explorer — to view the help files, and Adobe® Acrobat® Reader® to view the manuals.

Insert the enclosed CD into your computer and the installer should auto-start. The installer program will create `C:\Renesas` and `C:\Workspace` folders on your machine. NC30WA, FoUSB Programmer, Documentation, sample code, and other QSK-related files are in the `C:\Renesas` folder. HEW is installed in the `C:\Program Files\Renesas` folder by default.

If the installer program does not start, browse to the CD's root folder and double-click on `QSK-installer.exe` to start the installation.

3.0 Limited Guarantee and Support

Renesas Technology America, Inc., warrants the QSK26A to be free from component or assembly defects for a period of 180 days from the date of purchase. Settlement is limited to repair or replacement of the product only. Renesas Technology America, Inc., does not assume any liability arising out of the application or use of any product, circuit or procedure described herein. No other liability or warranty applies, expressed or implied. Software warranty is limited to replacement of the CD only. While every attempt has been made to ensure accurate documentation, Renesas Technology America, Inc., cannot be held responsible for errors or omissions, and reserves the right to make changes without prior notice.

Support for the QSK26A kit is provided via the following channels only:

1. Online User Forums at www.renesasunivsersity.com
2. Digikey Technical Support: www.digikey.com, click the “Contact Us” link
3. Renesas Technical Support Center, email at techsupport@renesas.com

4.0 System Connectivity

The following lists the hardware and software products required for using the QSK26A Quick Start Kit.

- Host Computer (supplied by user)
- QSK26A Board
- Mini USB cable
- Software Tools (HEW IDE, NC30 Compiler/Linker, FoUSB Programmer)

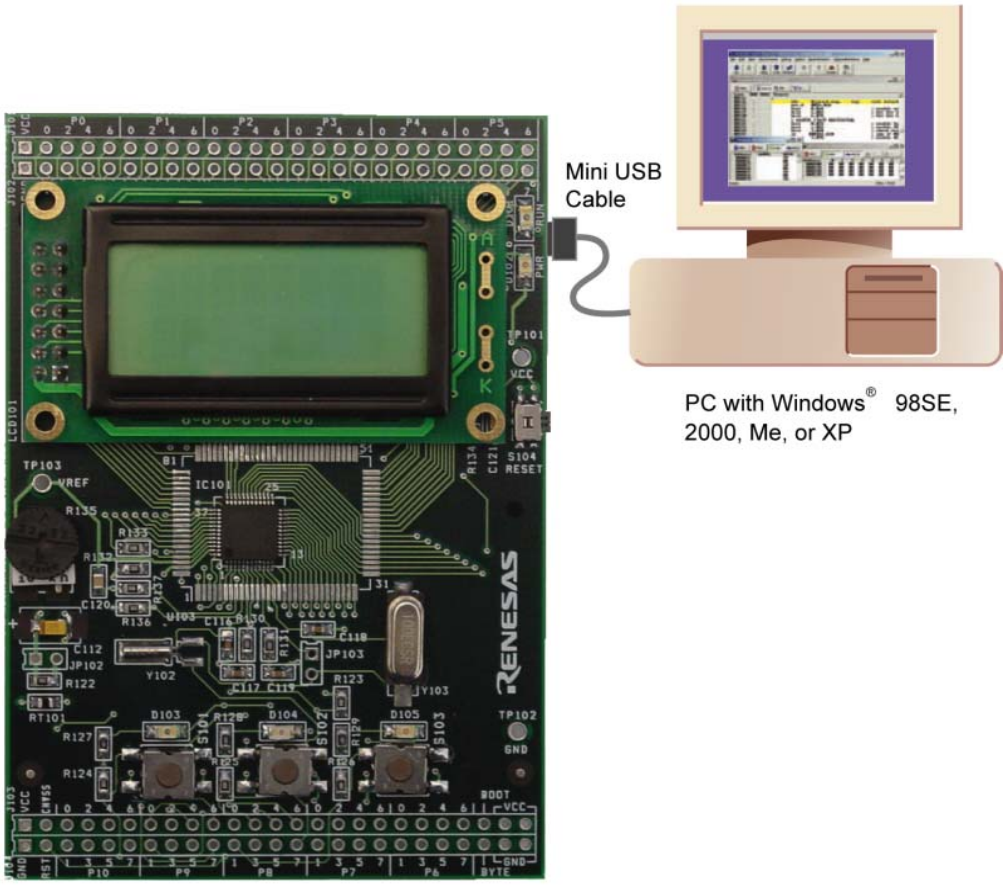


Figure 4-1: QSK26A System Connectivity

4.1. Host Computer Requirements

The minimum requirement to be able to use the software that comes with the QSK26A is a PC with a USB port and Microsoft Windows 98, Me, 2000, or XP.

4.2. QSK26A Board

The QSK26A board provides an evaluation and development environment for the M16C/26A group MCUs. See section “5.0 Hardware” for more details.

4.3. Software Development Tools

The installer program installs all the development tools. For details on installation, see the QuickStart Guide or instructions in Appendix A of this manual. A brief description of all the included tools follows. Please refer to the individual tool manuals for detailed information.

4.3.1. HEW (High-performance Embedded Workshop)

HEW provides a Graphical User Interface (GUI) that integrates the software development tools and includes the C-compiler, assembler, linker, debugger and editor.

4.3.2. NC30WA Evaluation Version C Compiler

The evaluation version of the M3T-NC30WA C-compiler is provided with the same functionality as the commercial version except that link size will be restricted to 64 kBytes after 60 days from when you begin using the compiler. Contact your local sales representative if you wish to purchase a full license.

4.3.3. HEW Debug Interface

HEW communicates with a kernel (i.e. a ROM monitor program) on the target MCU through the ICD. This debug interface provides a highly efficient evaluation environment. Features include:

- Source-level debugging for assembly and C language
- Single-step command (unlimited breakpoints)
- Run command with 6 breakpoints* for the M16C/26A
- RAM monitor function
- C variable “watch” window

**Note: The number of breakpoints will vary depending on the M16C Flash MCU used.*

4.3.4. FoUSB (Flash-over-USB™) Programmer

The Flash-over-USB Programmer application provides In-System Programming capability for the starter kit or any target board using an M16C family Flash MCU (e.g. R8C, M16C, M32C). Please see the RTA-FoUSB-MON User’s Manual for more details.

5.0 Hardware

5.1. QSK26A Board

Figure 5-1 shows the QSK26A Board with major components identified.

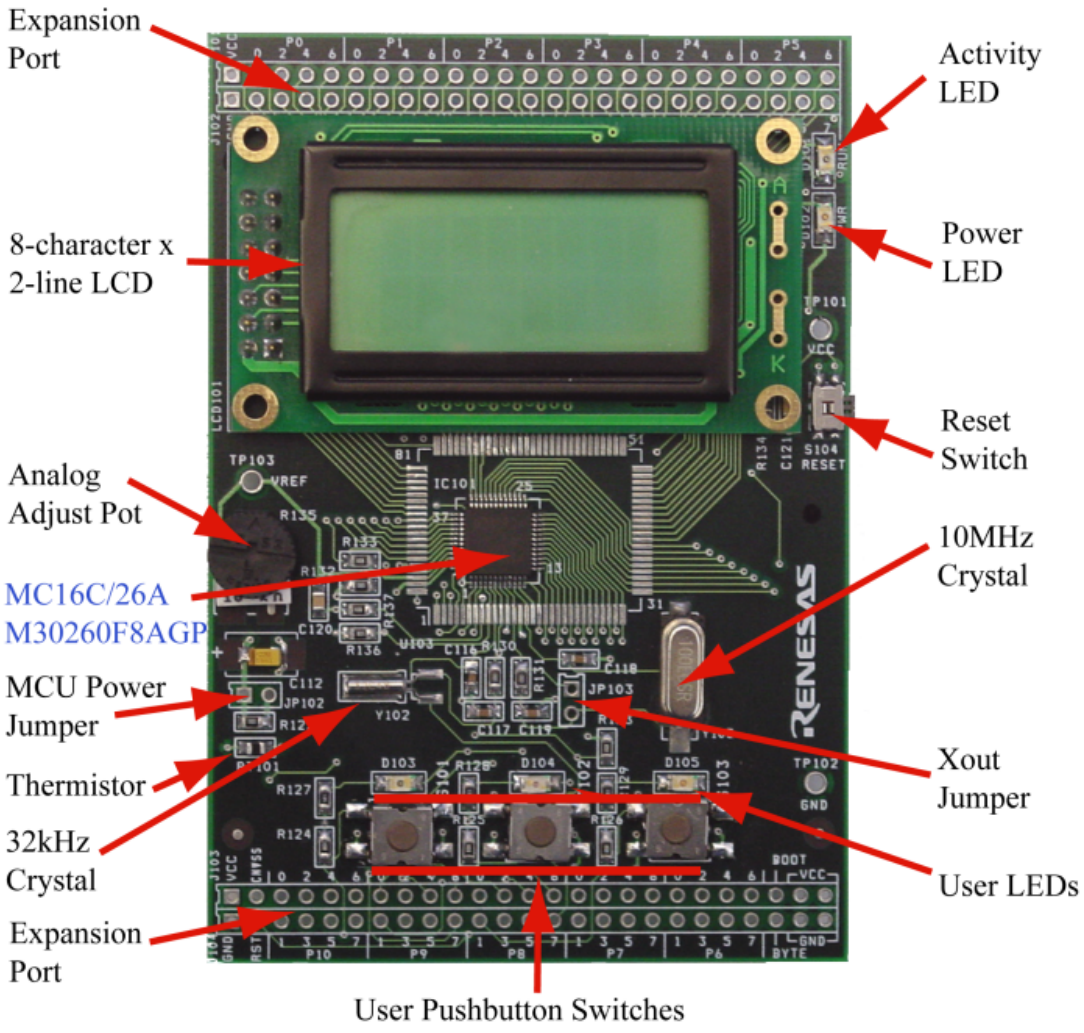


Figure 5-1: QSK26A Board

5.2. QSK26A Board Block Diagram

The QSK26A board incorporates an M30260F8AGP (48-pin QFP) from the M16C/26A group of microcontrollers, designated as IC101. Figure 5-2 shows the QSK26A block diagram.

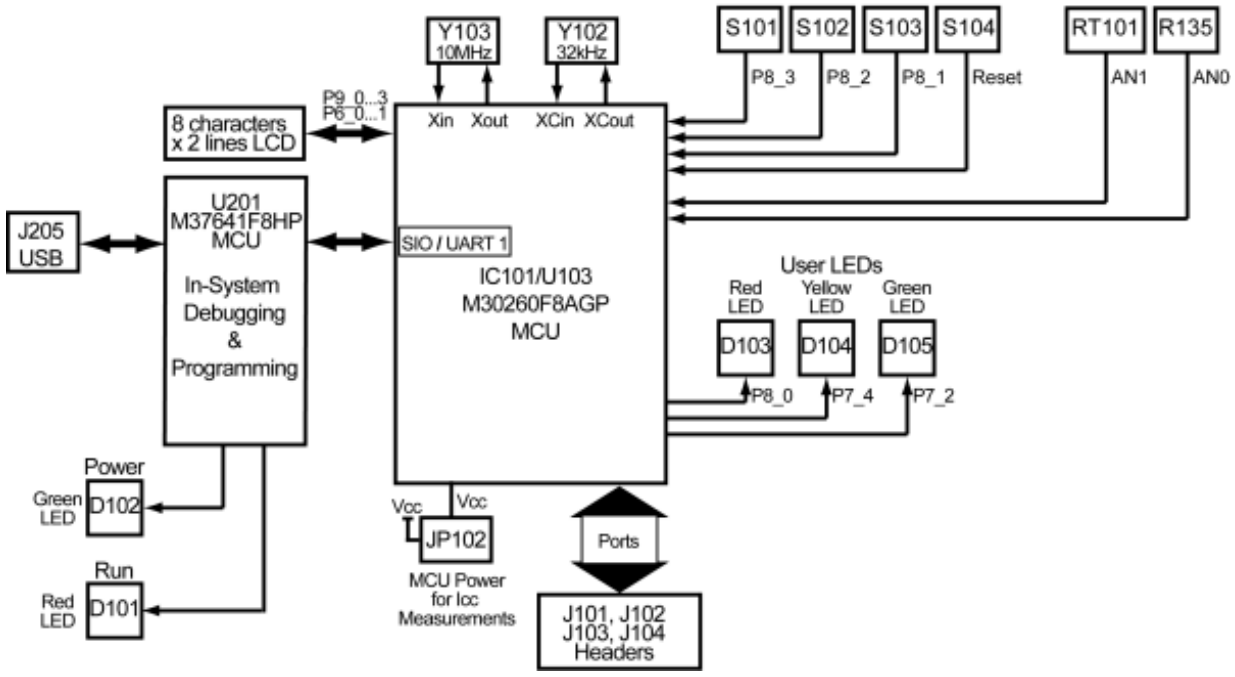


Figure 5-2: QSK26A Block Diagram

5.3. M16C/26A Group of MCUs

The M16C/26A group of 16-bit single-chip Flash microcontrollers (MCU) is part of the M16C/Tiny family and utilizes an M16C/60 series CPU core. The hardware and software manuals for the M16C/26A group of microcontrollers can be found in the `C:\Renesas\QSK26A\Docs` folder on your PC or from the Start menu (Start > Programs > Renesas > QSK26A > Document Descriptions) after QSK software installation.

5.4. QSK26A Board Jumper Configuration

5.4.1. JP1: MCU (U4) Power

5.4.2. Default Jumper Settings

Table 5-1: Default Jumper Settings

Jumper	Default Setting
JP102: MCU Power Measurement	Open*
JP103: Oscillator Stop Detection	Open*

** Both JP102 and JP103 are unpopulated and bypassed by 0Ω resistors. If the 0Ω resistors are removed and jumpers installed, the default setting for both jumpers would be "closed".*

Referring to the schematics in Appendix E, you can see that jumper JP102 is bypassed by R122, a 0Ω resistor. To measure the MCU current, you need to remove R122, install a jumper header in location JP102 and measure the current into the MCU by hooking up a multi-meter (in DC current mode) between the two header contacts. After measurement, place a jumper over the two contacts.

JP103 is bypassed also by a 0Ω resistor: R131. By removing R131, then installing a jumper header in location JP103 and placing a jumper over the header, the MCU oscillator works normally. Removing the jumper will stop the oscillator. This can be used to test the MCU's integrated Oscillator Stop Detection feature.

5.5. LCD (Liquid Crystal Display)

The LCD is a 2-line by 8-character display with a KS0066 controller IC.

6.0 System Operation & Limitations

The QSK26A provides sophisticated on-board debugging features at a low cost. The QSK26A's in-circuit debugging and programming circuitry (ICD) cannot be disconnected for use with other M16C based boards. For M16C boards without on-board debugging/programming circuitry, Renesas offers the functionally equivalent, standalone RTA-FoUSB-MON in-circuit debugger/programmer. You can find detailed information on the RTA-FoUSB-MON and its functionality in the RTA-FoUSB-MON user's manual.

The QSK26A does have some limitations when used with the HEW software debugger and the board's ICD circuit. Section 6.1 introduces the kernel (ROM monitor) program and its purpose. The limitations when this kernel is running with the user program are listed in Table 6-1.

Table 6-1: System Limitations when Debugging

Item	Please Refer To
User Limitations	6.2 Pin and Peripheral Limitations
	6.3 Memory Map
	6.4 Register Operation Limitations
	6.5 Limitations on Interrupts - Vectors that Reside in the Hardware Vector Table
Debugger Limitations	6.6 Stop or Wait Mode Limitations The kernel cannot be run in STOP or WAIT modes. Do not use these modes when debugging your program
	6.7 User Program's Real-Time Capability

6.1. Kernel (ROM Monitor) Introduction

During debug, a small program called a kernel is uploaded to the M16C/26A (M30260F8AGP) MCU. The kernel communicates with HEW through the ICD portion of the QSK26A board regarding MCU status during user code debugging operations.

There are no special steps required in the user program to make use of the ICD portion. The operation of the kernel is transparent to the user, but there are some limitations. These are discussed from section 6.2 onward.

After starting a HEW debug session, the ICD uploads the kernel to the M16C/26A if it does not already exist (e.g. on a blank device or a device that was programmed with the FoUSB Programmer). After downloading the kernel, the M16C/26A is ready to download user code.

Connecting the QSK26A board without starting HEW will not affect the signal lines connected between the ICD MCU (M37641F8) and the M16C/26A; the ICD MCU keeps the signal lines in high-impedance state. The ICD MCU only drives the pins after HEW or the FoUSB Programmer attempts to connect.

After completing program debug and verification with HEW, you can create an image of your code in Intel (.hex) or Motorola (.mot) file formats. This image can be programmed into the M16C/26A using the FoUSB Programmer. This procedure erases the kernel and leaves only the user program.

6.2. Pin and Peripheral Limitations

SIO/UART1 pins are used for communication between the M16C/26A kernel on the QSK26A board and the board's ICD MCU (M37641F8). Do not connect these pins to any other circuit, as SIO/UART1 cannot be used in the user program while using the Debugger.

6.3. Memory Map

The amount and locations of memory used by the kernel on the QSK26A board's M16C/26A MCU are shown in Figure 6-1.

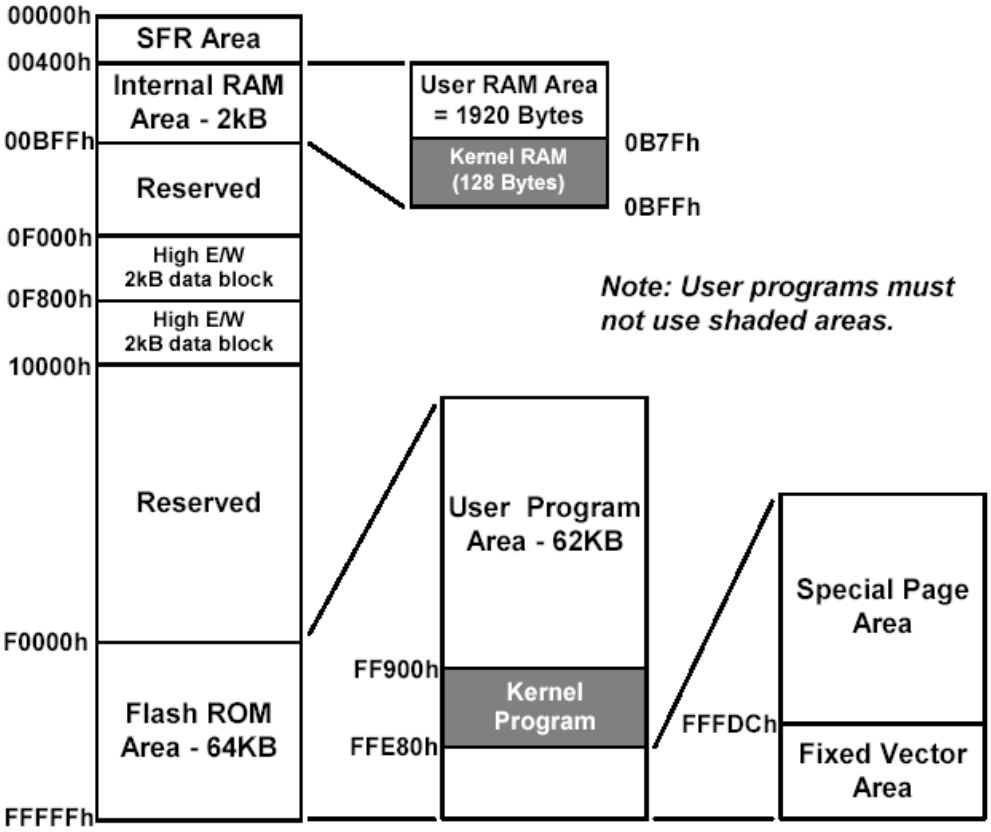


Figure 6-1: M30260F8AGP Memory Map with the Kernel Program

Note: The kernel occupies memory associated with special-page vector numbers 18-19 and 192-255. The user reset vector is re-mapped to address FFFD8h by the kernel.

6.4. Register Operation Limitations

Table 6-2 lists the limitations on register operation. The registers are inhibited from any modification. If register contents are modified in any way, kernel operation cannot be guaranteed.

Table 6-2: Limitations on Register Operation

Register Name	Restriction
User and Interrupt Stack Pointers	RAM memory range 0B80H – 0BFFH is used by the kernel. Do not set stacks in this area.
UART1 Transmit/Receive Mode Register UART1 Transmit/Receive Control Register 0 UART1 Transmit/Receive Control Register 1	Do not change.
UART1 Interrupt Control Register 0	Do not change.
UART Transmit/Receive Control Register 2	Do not change bits 0 and 2.
UART1 Transmit Buffer Register	Do not write to this register.

UART1 Receive Buffer Register	Do not read this register.
Port 6 and Port 6 DDR	To prevent changes on P6_4 data and direction, use read-modify-write only instructions (BSET, BCLR, AND, OR, etc.).

6.5. Limitations on Interrupts - Vectors that Reside in the Hardware Vector Table

Table 6-3 lists the limitations on hardware interrupt (i.e. fixed) vector addresses.

Table 6-3: Interrupt Vector Addresses

Interrupt Cause	M16C/26A Vector Address	Kit Specification
Undefined	FFFDCh ~ FFFDFh	User available
Overflow	FFFE0h ~ FFFE3h	User available
BRK Instruction	FFFE4h ~ FFFE7h	User inhibited
Address Match	FFFE8h ~ FFFEBh	User inhibited
Single-step	FFFECh ~ FFFEFh	User inhibited
Watchdog Timer	FFFF0h ~ FFFF3h	User available (Note 1)
DBC	FFFF4h ~ FFFF7h	User inhibited
NMI	FFFF8h ~ FFFFBh	User available
RESET	FFFFCh ~ FFFFFh	Reset vector (Note 2)

NOTES:

(1) The Watchdog Timer vector is shared with the oscillation stop and voltage detection interrupts. The vector is available for oscillation stop and voltage detection interrupts, but you must avoid using the vector for watchdog timer interrupts.

(2) The kernel transparently relocates the Reset vector to FFFD8h.

6.6. Stop or Wait Mode Limitations

The kernel cannot be run in STOP or WAIT modes. Do not use these modes when debugging your program.

6.7. User Program's Real-Time Capability (Very Important – Please Read)

Please be aware that while the kernel is in a "STOP" state, the hardware peripherals will continue to run. Therefore, interrupts may not be serviced properly. In addition, the watchdog timer will not be serviced and will likely time out if active.

While the kernel is in a "RUN" state, there is no overhead on the application code **unless** a RAM monitor window is open. This window requires periodic communication with the MCU. This communication suspends normal application operation while servicing the request (approximately 2000 BCLK cycles for each 16 Bytes of data displayed in the window are used per window update). The user must determine whether this behavior is acceptable.

6.8. Performing Debug Using Symbols

Normally when a new project is created using HEW, debugging symbols are enabled. If you are unable to view the source properly during debug, add the debug option [-g] in HEW before compiling the programs. To enable the [-g] option, perform the following:

- Open the workspace and project in HEW.
- Select 'Renesas M16C Standard Toolchain' from the Options pull-down menu.
- Click on the [Link] tab.
- Select 'Output' under the 'Category' list box.

- Click on the checkbox for [-g] ‘Outputs source debug information…’
- Click on the <**OK**> button

For more information, see the HEW user’s manual.

7.0 QSK26A Board Specifications

7.1. Hardware Specifications

Table 7-1 lists the specifications of the QSK26A Board.

Table 7-1: QSK26A Board Specifications

Item	Specification
MCU	M30260F8AGP
Clocks	Main Clock: crystal 10 MHz, PLL, or ring oscillator Sub Clock: 32.768 kHz crystal
Memory	RAM: 2kB (1920 Bytes user available due to kernel) High E/W Data Block: 2kB × 2 Flash ROM: 62kB (63,744 Bytes)
Connectors	[J101-J104]: Four 25-pin, single row, measurement test points connected to the MCU pins. Can also be used to connect your own expansion boards via 2×25 headers. [J205]: Mini-USB connector, used for in-circuit debugging and programming
Jumpers	[JP102]: MCU Power for Icc Measurements [JP103]: Oscillator Stop detection
Switches	[S101]: Pushbutton (connected to P8_3) [S102]: Pushbutton (connected to P8_2) [S103]: Pushbutton (connected to P8_1) [S104]: Pushbutton (connected to Reset)
LEDs	[D101] (Red): Run LED (in-circuit debugging/programming activity) [D102] (Green): Power [D103] (Red): User output (connected to P8_0) [D104] (Yellow): User output (connected to P7_4) [D105] (Green): User output (connected to P7_2)
LCD	2-line × 8-character LCD with KS0066 controller IC

7.2. QSK26A Power & Run LED Status

The green Power LED (D102) and the red Run LED (D101) indicate operating status of the QSK26A board. The board's M37641F8HP MCU that controls the In-Circuit Debugging and Programming functionality of the board also controls both LEDs. For the LEDs to function as per the table below, it is necessary that the M37641F8HP MCU is programmed with the correct MCU Monitor Image (MMI) for the QSK26A. Boards shipped from the factory have the correct MMI loaded. In case your board's MMI ever gets corrupted, see "Appendix B Updating the QSK26A Board's In-Circuit Debugger & Programmer Firmware" for help.

QSK26A Status	Power LED (green)	Run LED (red)
No Power (USB cable disconnected)	Off	Off
Connected, USB not enumerated (driver not installed)	Blinking	Off
Connected, USB enumerated	On, Solid	Off
KD30 Software Debugger running	On, Solid	On, Solid

7.3. Power Supply Requirements

The QSK26A Board is powered by the USB bus. It will draw about 50mA with no LEDs on.

7.4. Operating Environment

Table 7-2 lists the environmental conditions for using and storing the QSK26A board. Store the board in a conductive bag inside the original factory packaging.

Table 7-2: Operating and Storage Environments

Environmental Condition	Ambient Temperature	Ambient Humidity
Operating	0 to 55°C (No corrosive gas allowed)	30 to 80% (non-condensing)
Storage	-30 to 75°C (No corrosive gas allowed)	30 to 80% (non-condensing)

Appendix A. Troubleshooting Guide

This section discusses possible problems you may encounter while installing the development tool software, USB drivers, or running the HEW debugger and FoUSB Programmer applications. This section also discusses the countermeasures and solutions to resolve these problems.

If, for any reason, you cannot resolve the problem, further assistance is available via the following support channels:

1. Online User Forums at www.renesasunivsersity.com
2. Digikey Technical support: www.digikey.com, click the “Contact Us” link
3. Renesas Technical Support Center, email at techsupport@renesas.com

A.1 Manual Installation

Before connecting the QSK26A to your PC, the driver files (.inf and .sys) and executables must be copied to the `C:\Renesas\FoUSB` directory.

To do this, run `FoUSB_Vx.xx.exe` in the `\Tools\FoUSB` directory of the CD. After the FoUSB Programmer installation, assuming the default directory was used, you should find a `C:\Renesas\FoUSB` folder. The Windows USB drivers can be found under the `USB Drivers` subfolder, i.e. `fousb.inf`, `fousb.sys` (driver files to run FoUSB Programmer), `usbmon.inf`, and `usbmon.sys` (driver files to run HEW).

A.2 USB Driver Problems

This part discusses how to fix common problems that may occur with USB driver installation. The most common problem is that Windows did not properly install the USB drivers, so the QSK26A is not recognized. An indication of this problem is the QSK26A’s red Power LED blinking. When the driver is installed properly, the red Power LED will be on solid.

Before trying the following steps, try restarting your PC to see if this resolves the problem. You can check the USB Driver status using the Windows Device Manager (Start > Control Panel > System Properties > Hardware > Device Manager > Universal Serial Bus controllers). If the “Renesas FoUSB ICD” appears under the Universal Serial Bus controllers with **no** red X or yellow exclamation point, the driver was installed properly.

NOTE: If you are using Windows 2000 or XP, you will need Administrator privileges to be able to install the drivers.

For cases where “Renesas FoUSB ICD” appears with a red X or yellow exclamation point in the Windows Device Manager, please try the following:

1. Open the Windows Device Manager (Start > Control Panel > System Properties > Hardware > Device Manager > Universal Serial Bus controllers).
2. Double-click on ‘Renesas FoUSB ICD’. A Renesas FoUSB ICD Properties dialog box appears.
3. Click on the [Driver] tab and click the <**Update Driver**> button.
4. Select ‘Display a list…’ and click on the <**Have Disk**> button.
5. Browse to the `C:\Renesas\FoUSB\USB Drivers` directory and install the `usbmon.sys` driver.
6. If this process does not work, please follow the instructions below.

If you encounter problems on installing the drivers, you can try the following:

Windows 2000

a. Copy the `fousb.inf` and `usbmon.inf` files from the `C:\Renesas\FoUSB\USB Drivers` folder to the `\WINNT\INF` folder.
b. Copy the `fousb.sys` and `usbmon.sys` files from the `C:\Renesas\FoUSB\USB Drivers` folder to the `\WINNT\SYSTEM32\drivers` folder.

Windows 98 or XP

a. Copy the `fousb.inf` and `usbmon.inf` files from the `C:\Renesas\FoUSB\USB Drivers` folder to the `\WINDOWS\INF` folder.
b. Copy the `fousb.sys` and `usbmon.sys` files from the `C:\Renesas\FoUSB\USB Drivers` folder to the `\WINDOWS\SYSTEM32\drivers` folder.

A.3 Debugging Problems

This section discusses the causes of common problems and countermeasures to resolve them. The common problems encountered with debugging are:

- Erratic debug behavior
- Can't connect to target
- Issues that may come up during debug operations
- Can't debug in HEW

A.3.1 Erratic Debug Behavior

HEW allows you to launch multiple instances of itself. However, if more than one instance of HEW is open during a debug session, erratic behavior can result. Running the FoUSB Programmer at the same time as HEW can result in erratic debug behavior also. Furthermore, having more than one QSK26A board or a Renesas external ICD installed can also cause erratic problems or cause HEW to crash.

A.3.2 Can't Connect to Target

If the message "Can't connect with the target" is displayed when attempting to connect, there are several reasons that may have caused this message to appear. Each cause and its corresponding countermeasure is discussed below.

- The QSK26A board is not connected correctly.

Unplug the QSK26A board from the USB cable. Then connect the QSK26A board back to your PC's USB port via the supplied mini USB cable. Please see section "4.0 System Connectivity".

- The QSK26A board has no power (Power LED of the QSK26A is off).

The QSK26A board's power is supplied via the USB bus. Check that your USB cable is not broken. Check that your PC's USB port is working correctly. If you connect the QSK26A via a USB hub, check the connectivity between the hub and your PC. If you use a self-powered hub, check the power supply of your hub.

- USB was not selected on the HEW Init dialog box.

Please select ‘USB’ from the Init dialog box that is displayed right after you start a debug session.

- The selected MCU on the ICD board and the actual target MCU (M16C/26A) do not match.

Close the error message by clicking on the <**OK**> button, then click on the <**Cancel**> button of the Init window. Make sure you select ‘M30260F8A.mcu’. If the MCU loaded on the ICD is different, HEW will re-program the ICD to match it.

- The target MCU is damaged.

Try a different target board and see if HEW will connect. You may have a damaged board or MCU.

A.3.3 Can’t Debug in HEW

HEW 4.0 is the first version of HEW to integrate the M16C debug interface. If you have inadvertently installed an older version of HEW, you will need to uninstall it and re-install HEW4.

A.3.4 Issues that May Arise During Debug Operations

While debugging user code, some issues may come up because the limitations discussed in section “6.0

System Operation & Limitations" were not satisfied. The common issues are listed in Table A.3, including the countermeasures.

Table A.3

Problem	Possible Cause/s and Solution
After stepping a few instructions, HEW cannot "stop"	• Changes were made to the UART1 Special Function Registers (SFRs). Do **not** change UART1 SFRs in your code.
Breakpoints do not seem to work	• System is in "FreeRun" mode. Change the RUN mode to "Sampling" from the "Init" window (Emulator System icon).
HEW locks up (cannot stop program) or Communication error message is displayed	• Changes were made to the UART1 SFRs. Do **not** change UART1 SFRs in your code. • Ensure that no limitations in Section 6 were violated. • Re-initialize the system without closing debug session. See note below. • Do a hardware reset. User-program runaway may be corrupting the kernel (RAM, interrupt vectors, flags, etc.). Close the debug session, hit the reset button on the QSK board to reset the board, then restart.
Download problems	• HEW project was not set up properly (startup files missing or out of order, files added to wrong member, etc.). Try creating a new project and adding your source files to it. For details, please see the HEW User's Manual.

To re-initialize the system without closing a debug session, try the following:

- Click the <**OK**> button on the error dialog box to close it.
- When an Exit dialog box appears, click the <**Cancel**> button to close it.
- Press the reset button on the QSK26A board.
- Click the HEW Reset icon.

After initialization, debugging can resume. However, it is recommended that you download your program again before debugging.

Appendix B. Updating the QSK26A Board's In-Circuit Debugger & Programmer Firmware

This section discusses how to update the firmware of the QSK26A board's M37641F8 MCU, which is used to implement the board's in-circuit debugging (ICD) and programming functionality. Under normal circumstances, you should never have to perform this update, unless the ICD MCU's memory becomes accidentally corrupted.

The M37641F8 MCU has a boot mode that can be used to program the MCU's user Flash area. The procedure to activate the boot mode to re-program the Flash firmware is described in the following steps.

1. Unplug the QSK26A board unit from the USB cable.
2. Locate the contact labeled "BOOT" on connector J103 and, if not done already, solder a 2-pin, 2.54mm (0.100 mil) jumper header into the "BOOT" and the adjacent "VCC" contact hole to the right.
3. Shunt the jumper header with a 2.54mm (0.100 mil) jumper, thus connecting the BOOT signal to Vcc. This will force the M37641F8 MCU to run in boot mode when it is powered up.

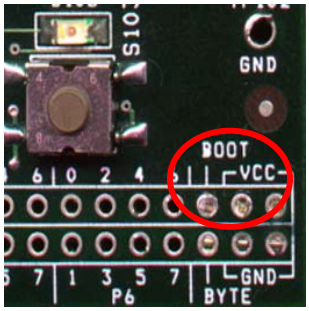


Figure 7-1: Boot Jumper Location

4. Plug the USB cable back in. The M37641F8 MCU will now be in boot mode and will communicate as a USB device to the PC. In boot mode, the M37641F8 MCU uses a different USB Driver than the In-Circuit Debugger/Programmer application, so you will need to load another USB Driver when doing this procedure for the first time. The Windows New Hardware Wizard should automatically start and guide you through the installation of the required USB driver. The driver is located in `C:\Renesas\FOUSB\USB Drivers`.
5. Open the Flash-over-USB program. Note that the MCU device name displayed in green on the front screen will change automatically to M37641F8 without having to select that device.
6. Click on the <**Load MMI**> button on the right. This opens a chip selection window.

Figure 7-2: Load MMI Button

7. Select the M16C/Tiny Series > M16C/26A Group > M30260F8A part and click the <**OK**> button to load the selected MCU Monitor Image (MMI) to the ICD MCU.

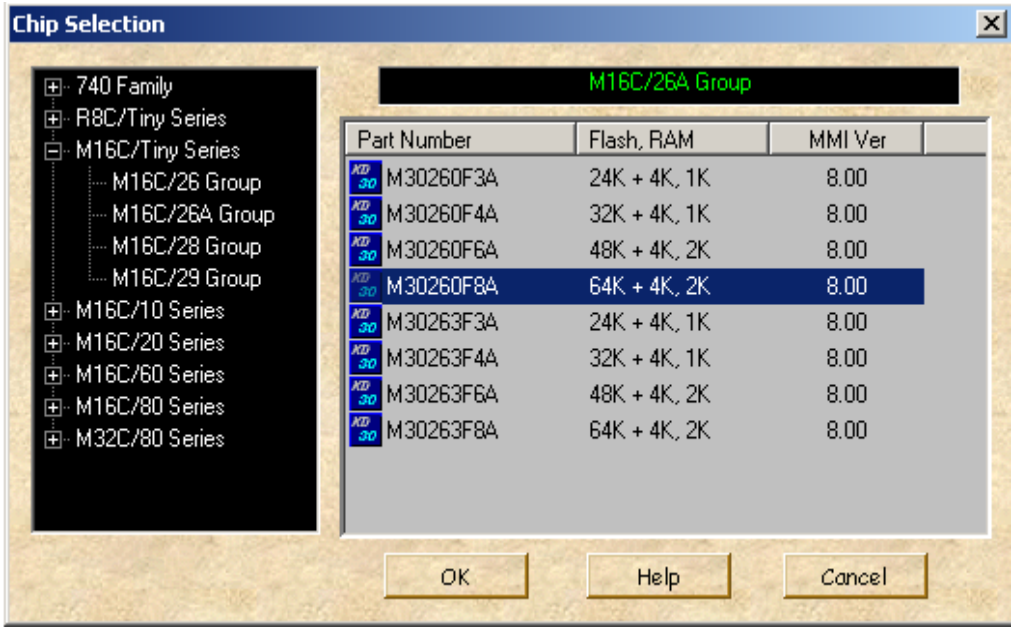


Figure 7-3: Chip Selection Window

8. Unplug the USB Cable and remove the jumper connecting the BOOT signal to Vcc. Reconnect the QSK26A board to your PC with the USB cable.
9. After you connect the QSK26A board back to the PC, the FoUSB Programmer should show the target MCU device name you selected earlier.

Appendix C. Reference Manuals

Item	Title	Description
1.	**QSK26A Quick Start Guide**	Document that will help you get started on using the QSK26A Starter Kit.
2.	**QSK26A User's Manual**	This document.
3.	**QSK26A Board Schematic**	Schematic diagram for the RF Sniffer and QSK boards.
3.	**QSK26A Board BOM**	Bill of materials for the QSK board.
5.	**M16C/20/60 Series C-Language Programming Manual**	ANSI C-language programming guide for the M16C/20/60 series MCUs.
6.	**M16C/20/60 Series Assembly Language Programming Manual**	Assembly language programming guide for the M16C/20/60 series MCUs.
7.	**HEW User's Manual**	Document that describes installation and operation of this Integrated Development Environment for Renesas' Tools.
8.	**AS30 User's Manual**	Guide for AS30 assembler.
9.	**NC30 User's Manual**	Guide for NC30WA C-compiler.
10.	**RTA-FoUSB-MON User's Manual**	Information on in-circuit debugging and programming

NOTE:
The installer will copy all these manuals during installation. They can be viewed using the Document Descriptions file by clicking on Start > Programs > Renesas > QSK26A > Document Descriptions.

Appendix D. Expansion Headers

The M30260F8AGP MCU on the QSK26A target board is housed in a 48-pin QFP package. Pin 1 of the package is identified by the number '1' on the board's top silkscreen. Connectors J101 to J104, located on the long sides of the board, provide access to almost all of the MCU's pins. You can use J101 to J104 as test points to check MCU signals or, by mounting your own headers, to connect your own expansion board. The silkscreen identifying the connectors is at the top of the QSK26A board. The following table shows the mapping of J101 to J104 pins to MCU pins and signal names.

J101 Pin	100 QFP MCU Pin	48 QFP MCU Pin	MCU Function
1	16, 62,99	11,47	Vcc
2	88	na	$P0_0/D_0$
3	86	na	$P0_2/ D_2$
4	84	na	$P0_4/ D_4$
5	82	na	$P0_6/ D_6$
6	80	na	$P1_0/ D_8$
7	78	na	$P1_2/ D_{10}$
8	76	na	$P1_4/D_{12}$
9	74	35	$P1_6/ D_{14}/\overline{INT_4}$
10	72	na	$P2_0/A_0/ \overline{D_0}$
11	70	na	$P2_2/ A_2/ \overline{D_2}$
12	68	na	$P2_4/ A_4/ \overline{D_4}$
13	66	na	$P2_6/ A_6/ \overline{D_6}$
14	63	na	$P3_0/ A_8/ \overline{D_8}$
15	60	na	$P3_2/ A_{10}$
16	58	na	$P3_4/ A_{12}$
17	56	na	$P3_6/ A_{14}$
18	54	na	$P4_0/ A_{16}$
19	52	na	$P4_2/ A_{18}$
20	50	na	$P4_4/ \overline{CS_0}$
21	48	na	$P4_6/\overline{CS_2}$
22	46	na	$P5_0/\overline{WRL}$ / $\overline{WR}$
23	44	na	$P5_2/\overline{RD}$
24	42	na	$P5_4/\overline{HLDA}$
25	40	na	$P5_6$/ALE

J102 Pin	100 QFP MCU Pin	48 QFP MCU Pin	MCU Function
1	14, 64,96	9,44	Gnd
2	87	na	$P0_1/ D_1$
3	85	na	$P0_3/ D_3$
4	83	na	$P0_5/ D_5$
5	81	na	$P0_7/ D_7$
6	79	na	$P1_1/ D_9$
7	77	na	$P1_3/ D_{11}$
8	75	36	$P1_5/ D_{13}/\overline{INT_3}$
9	73	34	$P1_7/ D_{15}/\overline{INT_5}$
10	71	na	$P2_1/ A_1/ \overline{D_1}$
11	69	na	$P2_3/ A_3/ \overline{D_3}$
12	67	na	$P2_5/ A_5/ \overline{D_5}$
13	65	na	$P2_7/ A_7/ \overline{D_7}$
14	61	na	$P3_1/ A_9$
15	59	na	$P3_3/ A_{11}$
16	57	na	$P3_5/ A_{13}$
17	55	na	$P3_7/ A_{15}$
18	53	na	$P4_1/ A_{17}$
19	51	na	$P4_3/ A_{19}$
20	49	na	$P4_5/\overline{CS_1}$
21	47	na	$P4_7/\overline{CS_3}$
22	45	na	$P5_1/\overline{WRH}$ / $\overline{BHE}$
23	43	na	$P5_3$/BCLK
24	41	na	$P5_5/\overline{HOLD}$
25	39	na	$P5_7/\overline{RDY}$ /CLKOUT

J103 Pin	100 QFP MCU Pin	48 QFP MCU Pin	MCU Function
1	16, 62,99	11,47	Vcc
2	9	4	CNVss
3	97	45	$P10_0/AN_0$
4	94	42	$P10_2/AN_2$
5	92	40	$P10_4/AN_4/\overline{KI_0}$
6	90	38	$P10_6/AN_6/\overline{KI_2}$
7	7	3	$P9_0/TB_{0in}$
8	5	1	$P9_2/TB_{2in}$
9	3	na	$P9_4/DA_1/TB_{4in}$
10	1	na	$P9_6/AN_{EX1}/S_{OUT4}$
11	22	17	$P8_0/TA_{4out}/U$
12	20	15	$P8_2/\overline{INT_0}$
13	18	13	$P8_4/\overline{INT_2}$
14	na	6	$P8_6/X_{cout}$
15	30	25	$P7_0/TxD_2/SDA/TA_{0out}$
16	28	23	$P7_2/CLK_2/TA_{1out}/V$
17	26	21	$P7_4/TA_{2out}/W$
18	24	19	$P7_6/TA_{3out}$
19	38	33	$P6_0/\overline{CTS_0}/\overline{RTS_0}$
20	36	31	$P6_2/RxD_0$
21	34	29	$P6_4/\overline{CTS_1}/\overline{RTS_1}$ /$CLKS_1$
22	32	27	$P6_6/RxD_1$
23	na	na	BOOT*
24	16, 62,99	11,47	Vcc
25	16, 62,99	11,47	Vcc

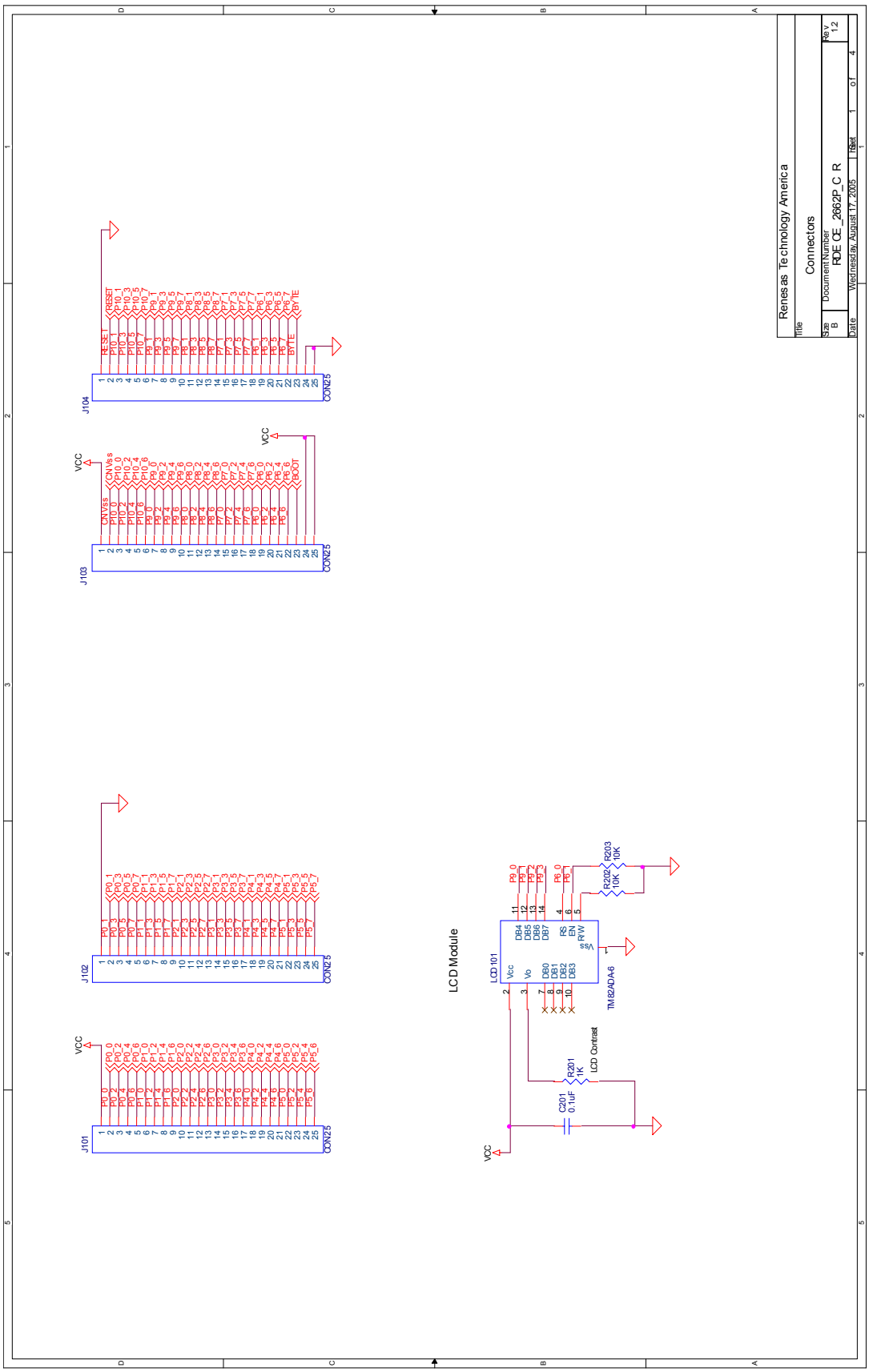
J104 Pin	100 QFP MCU Pin	48 QFP MCU Pin	MCU Function
1	14, 64,96	9,44	Gnd
2	12	7	$\overline{RESET}$
3	95	43	$P10_1/AN_1$
4	93	41	$P10_3/AN_3$
5	91	39	$P10_5/AN_5/\overline{KI_1}$
6	89	37	$P10_7/AN_7/\overline{KI_3}$
7	6	2	$P9_1/TB_{1in}$
8	4	48	$P9_3/DA_0/TB_{3in}$
9	2	na	$P9_5/AN_{EX0}/CLK_4$
10	100	na	$P9_7/\overline{AD_{Trg}}/S_{IN4}$
11	21	16	$P8_1/TA_{4in}/\overline{U}$
12	19	14	$P8_3/\overline{INT_1}$
13	17	12	$P8_5/\overline{NMI}/\overline{SD}$
14	na	5	$P8_7/X_{cin}$
15	29	24	$P7_1/RxD_2/SCL/TA_{0in}/TB_{5in}$
16	27	22	$P7_3/\overline{CTS_2}/\overline{RTS_2}/TA_{1in}/\overline{V}$
17	25	20	$P7_5/TA_{2in}/\overline{W}$
18	23	18	$P7_7/TA_{3in}$
19	37	32	$P6_1/CLK_0$
20	35	30	$P6_3/TxD_0$
21	33	28	$P6_5/CLK_1$
22	31	26	$P6_7/TxD_1$
23	8	na	BYTE
24	14, 64,96	9,44	Gnd
25	14, 64,96	9,44	Gnd

* The BOOT pin on J103 is connected to the M37641F8HP MCU that controls In-Circuit Debugging and Programming. If connected to the adjacent Vcc pin, it forces the M37641F8HP MCU into Boot Mode to enable firmware updates.

- Board Schematic & BOM

Note: The QSK26A board is referred to as RDECEUDK26A on the board's silkscreen.

The circuit board schematic and Bill-Of-Materials (BOM) are available as separate PDF documents. They can be viewed via Start > Programs > Renesas > QSK26A > Board Hardware, or by browsing to the folder `C:\Renesas\QSK26A\Docs` and opening the files:
`QSK26A_RevB.pdf`
`QSK26A_BOM_RevB.pdf`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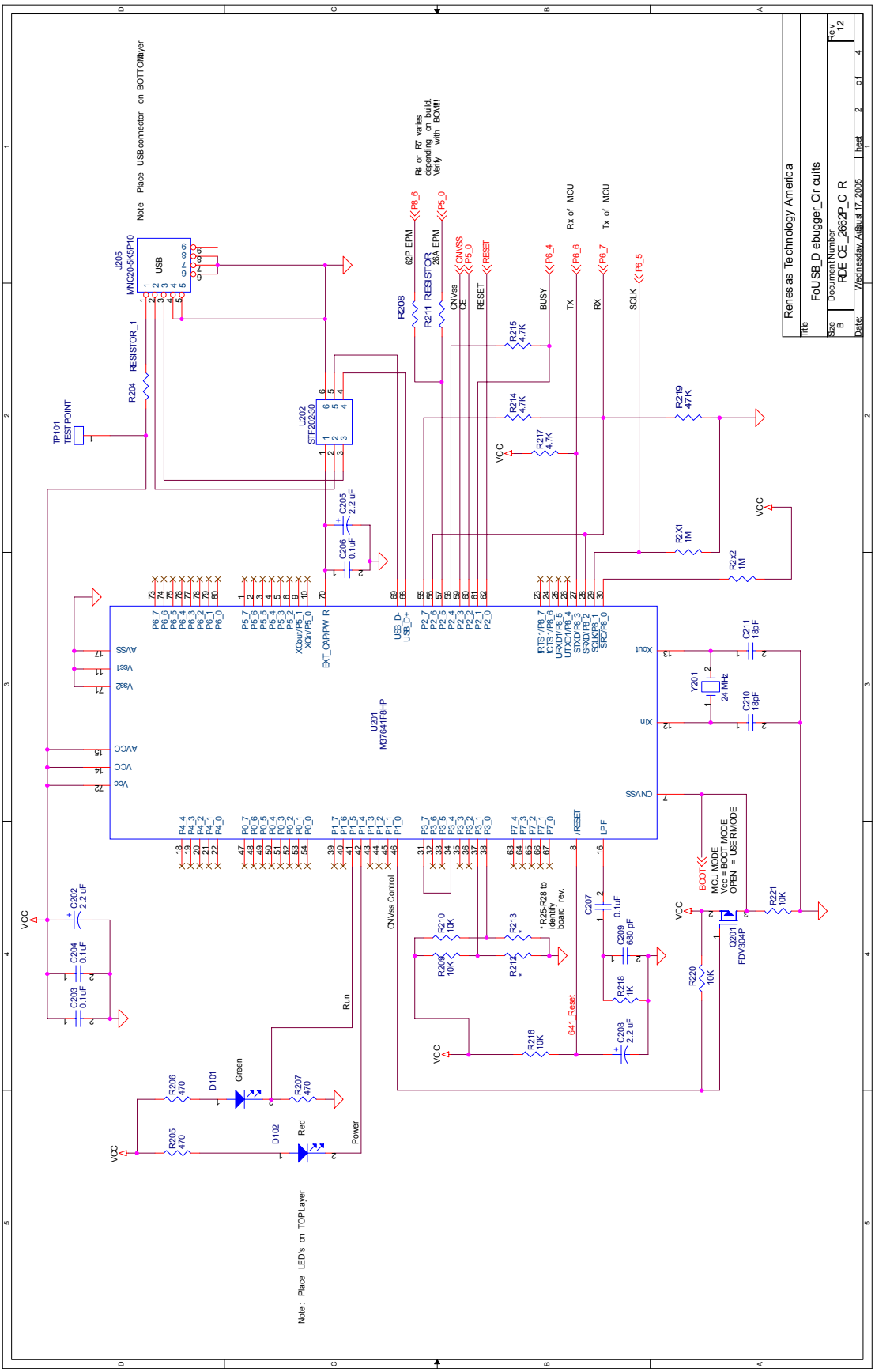
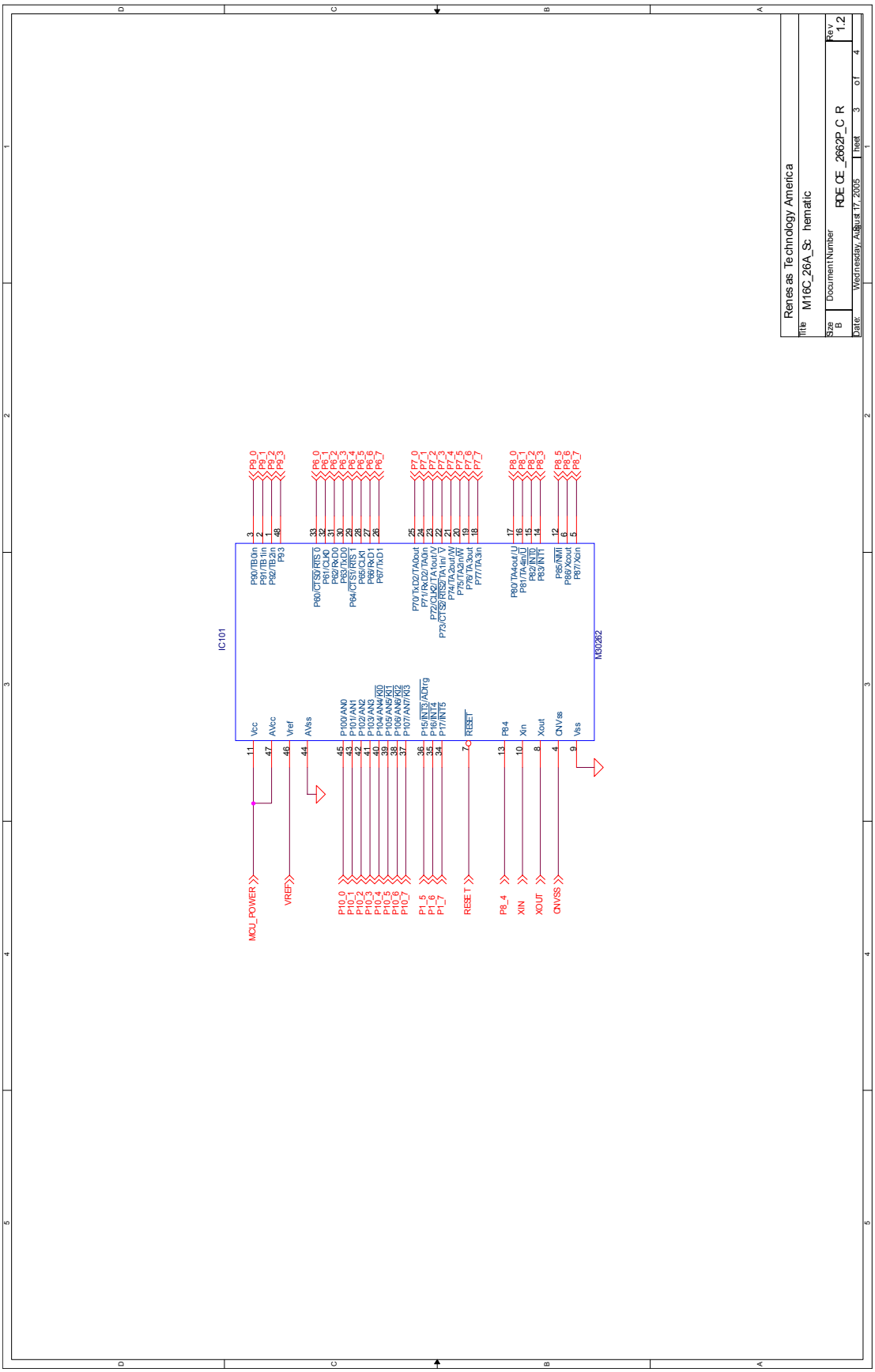
Rev 1.2
Date Wednesday, August 17, 2005
Sheet 1 of 1
J104
J103
J102
J101
CON25
VCC
RESET
BYTE
BOOT
LCD Module
LCD101
TM82ADA6
R201 1K
LCD Contrast
C201 0.1uF
R202 10K
R203 10K


Renesas Technology America
FoUSB_Debugger_Circuits
RDE_CE_2662P_C_R
Rev 1.2
Wednesday, August 17, 2005
Note: Place USB connector on BOTTOM layer
Note: Place LED's on TOP Layer
R4 or R7 varies depending on build. Verify with BOM!!
U201 M37641F8HP
U202 STF202-30
J205 MINC20-5K5P10
USB
TP101 TEST POINT
R204 RESISTOR_1
R208
R211 RESISTOR
R214 4.7K
R215 4.7K
R217 4.7K
R219 47K
R2x1 1M
R2x2 1M
C205 2.2 uF
C206 0.1uF
C202 2.2 uF
C203 0.1uF
C204 0.1uF
C207 0.1uF
C208 2.2 uF
C209 680 pF
C210 18pF
C211 18pF
Y201 24 MHz
R205 470
R206 470
R207 470
D101 Green
D102 Red
Power
Run
R209 10K
R210 10K
R212 *
R213 *
R216 10K
R218 1K
R220 10K
R221 10K
Q201 FDV304P
*R25,R28 to identify board rev.
641 Reset
CNVss Control
MCU MODE
Vcc = BOOT MODE
OPEN = USER MODE
BUSY
TX
RX
SCLK
Rx of MCU
Tx of MCU
62P EPM
26A EPM
CNVss
CE
RESET
VCC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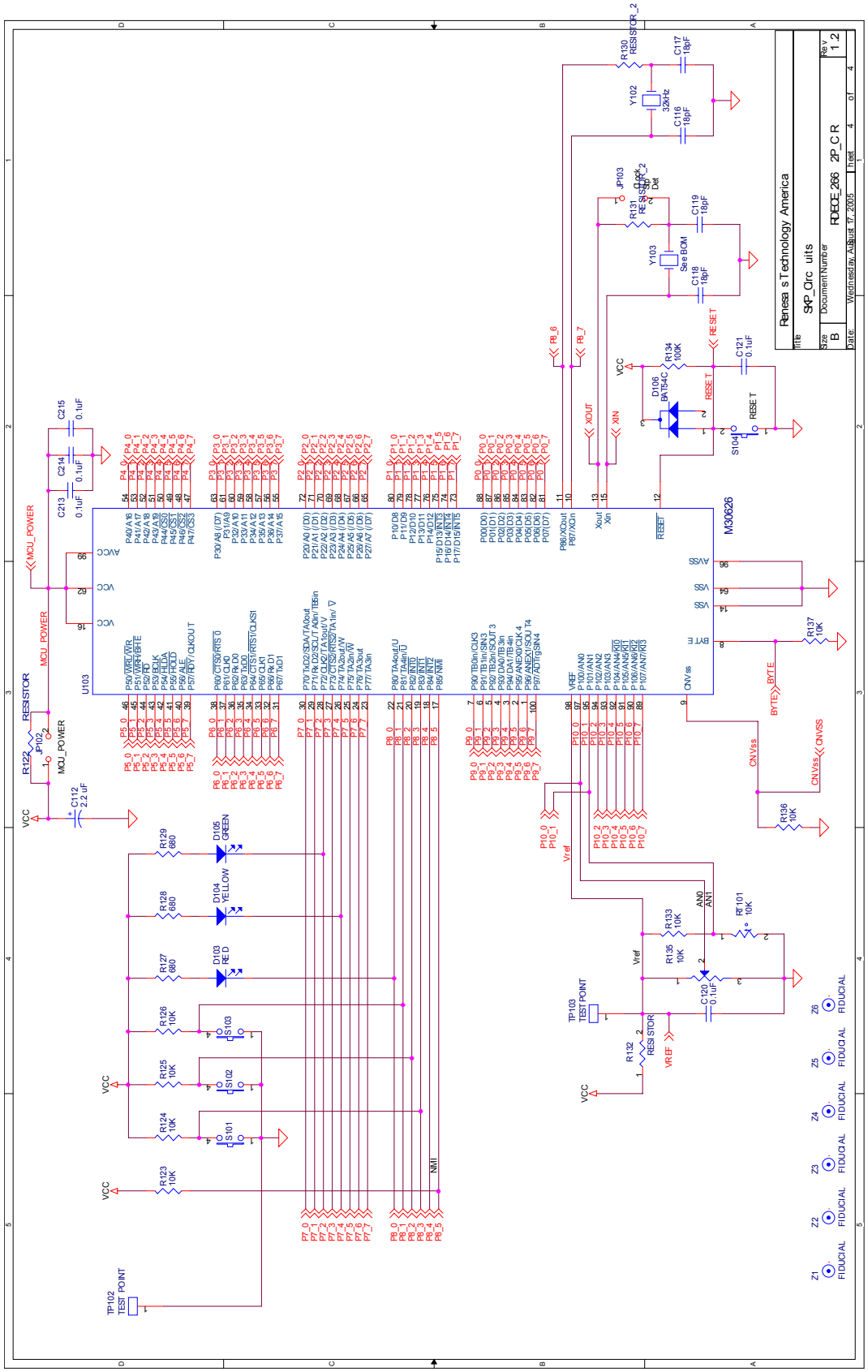

Appendix E. QSK26A Printed Circuit Board

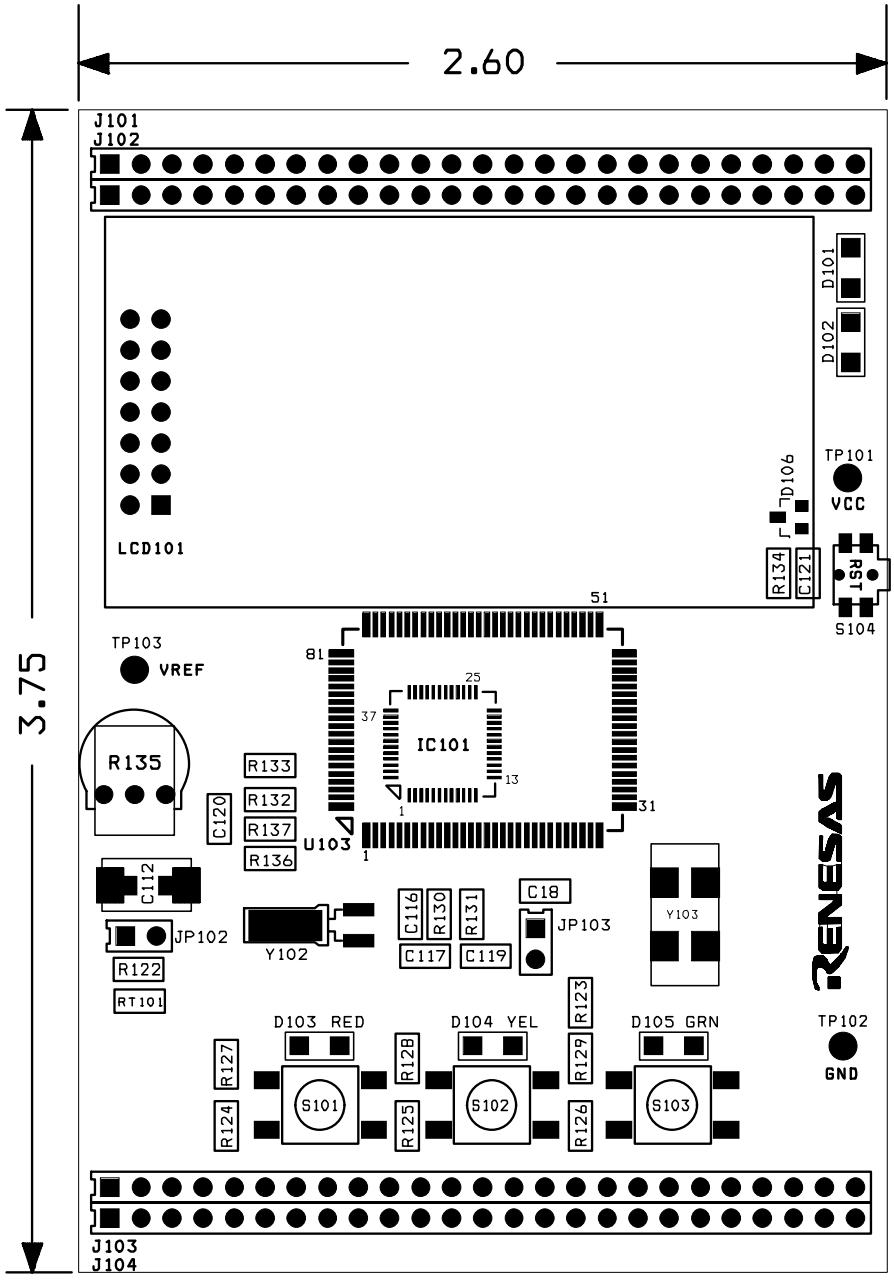

Figure E-1: PCB Top View

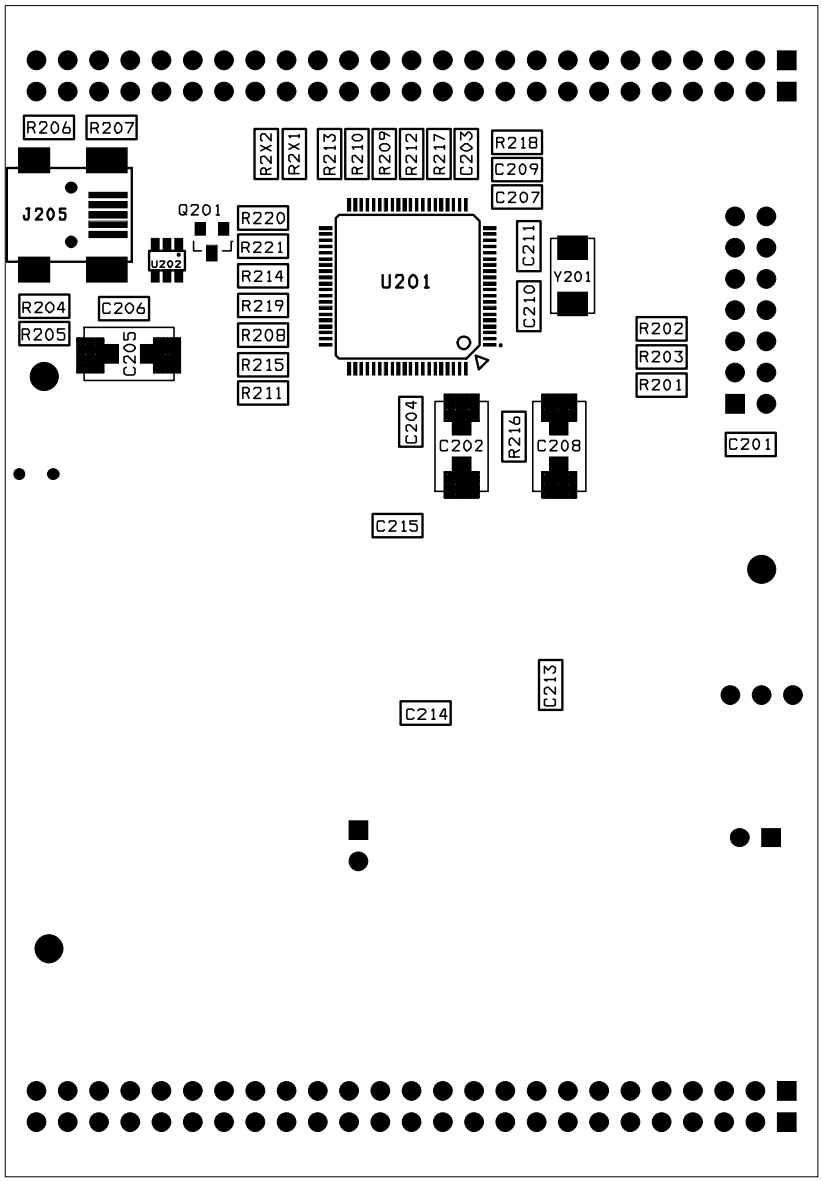

Figure E-2: PCB Bottom View

Appendix F. Other Resources

1. For updates and other evaluation tools, and sample programs for the QSK26A Kit, see: www.renesasuniversity.com.
2. Renesas microcontroller application notes and sample programs can be viewed at Renesas Technology America's website: http://www.renesas.com